

Most of the taxonomic characters of our specimens agree well with the description of *Triops granarius* as given by Sanjeeva Raj (1971). Our specimens are however almost half the size reported by Sanjeeva Raj (18-20 mm median carapace length: 9 mm in our sample). A few salient features of the four specimens are: carina on carapace prominent but without terminal spine, spine in the sulcus 44, dorsal surface of the posterior region of carapace with fine denticles, fifth endite of first thoracic leg projects beyond hind end of carapace; number of exposed segments behind sulcus 9, apodal segments 9; these segments possess 9 dorsal and 8 or 9 ventral prominent, chitinised, brown

spines; telson broader than last abdominal segment with two median spines, 3 setal spines and 2 transverse spines at posterior margin; lateral margin of telson spiny with 5 prominent spines; furca (12 mm) longer than carapace length.

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32. LIFE-HISTORY OF A SUCCINEID SNAIL *SUCCINEA DAUCINA* (PFEIFFER)

Succineids are found in meadows or on the banks of rivers, streams and lakes or in water. From these habitats they move on to neighbouring crop fields for feeding on agrihorticultural plants (Rigby 1965, Valovirta 1967, Lahdesmaki 1970, Godan 1983). Some of them are known to serve as intermediate hosts of cestode and trematode parasites of birds and cattle (Enigh *et al.* 1957, Godan 1983). India is represented by 25 species of Succineidae, belonging to five genera (Gude

1914, Rao 1925, Hora 1925) but information on the natural history of these snails is confined only to *Indosuccinea semiserica* (Gould) (Raut and Ghose 1984, Raut 1986). Recently, we had the opportunity to collect some live *Succinea daucina* (Pfeiffer) specimens from amongst the vegetation at the edge of a pond located in village Gopal chak, Contai, West Bengal, India. They were cultured in the laboratory and some aspects of their life-history were studied.

A total of 45 individuals measuring 6.1-9.0 mm in shell length and 3.9-6.0 mm in shell breadth were released into a culture container 45 x 20 x 30 cm in size. The container was filled with loose soil in such a fashion that the depth of the soil was 15 cm in one half of the container, sloping down gradually in the other half to 5 cm at the opposite wall. Pond water was poured into the container so that the whole of the slope was filled with water up to a level equivalent to the 15 cm deep adjacent soil area. Thus, the maximum height of the water column at the extreme point of the slope i.e. where the soil depth was minimum (5 cm) was 10 cm. A few plants of *Pistia stratiotes* were kept inside the container, both on the water and soil surfaces so as to simulate natural conditions for the snails. From time to time, water was sprayed on the soil as well as on *P. stratiotes* plants to maintain a humid environment inside the container. Since these snails were seen to feed on *P. stratiotes* in their natural habitat, no other food was offered to them.

The snails thrived well and deposited eggs on the soil surface as well as on the leaves of *P. stratiotes* within a few days. The eggs were kept under observation. On 15th February, 1994 seventeen newly hatched individuals were selected for the proposed study. These newly hatched snails were released into a separate container with similar specifications to the culture container. The snail culture was kept fresh by changing water and *P. stratiotes* plants at regular intervals. To record the growth rate, measurements of shell length, shell breadth and total body weight were taken at intervals of seven days. Age of attainment of sexual maturity, egg-laying potential, mortality and longevity of the snails was recorded.

The newly hatched (zero-day old) *S. daucina* of 1.0-1.5 mm (mean 1.1 + 0.09 SE) shell length, 0.5-1.0 mm (mean 0.6 + 0.09 SE) shell breadth and 0.25-0.5 mg (mean 0.3 + 0.05 SE) body weight grew to 6.0-7.0 mm (mean 6.25 + 0.22 SE) 3.5-5.0 mm (mean 4.0 + 0.29 SE) and 32-41 mg (mean 35.75 + 1.67 SE) in shell length, shell breadth and body weight

respectively during the period of 12 weeks. The snails began egg-laying at age 94 days. Of the 17 snails only 4 survived up to the age of oviposition. These 4 individuals produced 8 egg capsules containing a total of 20 eggs. The number of eggs varied from 1-5 per capsule. The eggs were transparent and round, usually 0.72 mm in diameter. They were clearly visible through the gelatinous, colourless capsule. The egg-laying snails survived up to the age of 157 days (maximum). Production of eggs was confined to a period of 15 days from the date of deposition of the first capsule. Of these 4 snails, 2 aestivated on June 4, 1994 (i.e. at the age of 110 days) while the other 2 died prior to aestivation. Of the 2 aestivated individuals one died on 17 June, 1994 and the other became active on 8 July, 1994 and died on 21 July, 1994. The eggs required 13-18 days (mean 14.93 + 0.14 SE) for hatching. Out of 20 eggs, 11 (55%) were successful in giving rise to young snails.

According to Rao (1925) succineids are truly amphibious, pseudo-amphibious or strictly terrestrial. Terrestrial forms resort to aestivation to overcome adverse climatic conditions (Rao, 1925; Hora, 1925; Raut, 1986). Since *S. daucina* live in close contact with water and are also able to aestivate (even though they have the opportunity to go into water) it is probable that they are on an evolutionary pathway to leading true terrestrial life.

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33. RARE OCCURRENCE OF VEGETATIVE LEAFLET OUTGROWTH ON THE LEAF OF MUSTARD *BRASSICA CAMPESTRIS* (BRASSICACEAE)

The leaves of mustard are raised in Mizoram as a vegetable locally, called as "Antum". On 15th June, 1996. I saw in Kolasib market of Aizawal district, outgrowths of leaflets on the dorsal surface of mustard leaf. On careful observations, I found some more mustard leaves with quite a large number (i.e. 5 to 10) of leaflet outgrowths, with maximum length of 11 mm. The leaflet outgrowths were more towards the margin of the leaf than the centre and around rachis. At Kolasib market this leafy vegetable is brought from Kolasib, and the surrounding area.

Mustard is propagated by germination of seed only, and to the best of my knowledge this growth, in the form of outgrowth of leaflets is

peculiar and of rare occurrence, and hence worthy of record.

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34. RECORD OF *ABUTILON RANADEI* WOODROW & STAPF IN AN AREA OTHER THAN TYPE LOCALITY

Abutilon ranadei Woodr. et Stapf (Malvaceae), an endemic and rare species was collected and reported by Woodrow (1897) and Cooke (1901) from Ambaghat of Ratnagiri district in Maharashtra. Since then there was no report on its occurrence, which made Ahmedullah and Nayar (1986) conclude that it

may be extinct. However, recently Mistry and Almeida (1989) collected the species from its type locality. Due to rarity and narrow range of distribution the species has been declared as endangered in the Red Data book (Nayar and Sastry, 1990). In 1993, it was collected from the famous Vasota fort in Koyna valley of Satara